

ILLINOIS COMMERCE COMMISSION

DOCKET No. 15-_____

DIRECT TESTIMONY

OF

DAVE WEDELL

Submitted On Behalf Of

AMEREN TRANSMISSION COMPANY OF ILLINOIS

April 10, 2015

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6 **Ameren Transmission Company of Illinois**

7 **I. INTRODUCTION AND WITNESS QUALIFICATIONS**

8 **Q. Please state your name and business address.**

9 A. David W. Wedell, 12755 Olive Blvd, Suite 100, St. Louis, Missouri 63141.

10 **Q. By whom are you employed and in what capacity?**

11 A. I am employed by POWER Engineers, Inc. I am a Senior Project Manager.

12 **Q. Please summarize your educational background and professional experience.**

13 A. A summary of my educational background and professional experience is attached as an
14 Appendix to my testimony.

15 **Q. What are your duties and responsibilities in your present position?**

16 A. My duties include serving as project engineer and designing transmission lines for the
17 Ameren utilities. These duties include designing transmission lines, designing structures, and
18 selecting hardware in accordance with National Electrical Safety Code requirements;
19 development of technical drawings; preparing cost estimates; assisting with the management of
20 project costs; and acting as the technical lead to assist the project team throughout the design,
21 procurement, and construction of the Illinois River Project.

II. PURPOSE AND SCOPE

Q. What is the purpose of your testimony?

A. In Docket 12-0598, the Commission authorized ATXI to construct, operate and maintain a new 345 kV transmission line running generally across central Illinois from Missouri to Indiana (the Project). The Commission approved a route for the Project, including a route from Quincy to Meredosia. The purpose of my testimony is to explain ATXI's interaction with the Federal Aviation Administration (FAA) as it relates to the route for the new 345 kV transmission line along a 2 ½ mile portion of this Quincy to Meredosia segment of the Project. As I explain, FAA requirements have made construction of this portion of the Quincy to Meredosia segment impractical because, as currently routed, the approved transmission line would interfere with the FAA's Quincy VORTAC facility. This requires the construction of the Transmission Line in a location that will not interfere with the VORTAC. ATXI has studied and identified new route alternatives along this 2 1/2 mile segment that will avoid interference with FAA regulated facilities. ATXI witness Ms. Emily Hyland describes these routes in her testimony.

Q. In addition to your testimony, are you sponsoring any other exhibits?

A. Yes. In addition to this direct testimony, I am sponsoring the following exhibit:

ATXI Exhibit 7.1 - Example of Notice of Presumed Hazard issued by FAA

III. FAA INVOLVMENT IN THE ROUTE DESIGN PROCESS FOR THE QUINCY TO MEREDOSIA SEGMENT

Q. Why is the FAA involved in the design of the Quincy to Meredosia segment of the Project?

A. After the Commission approved the Project, ATXI began final route design and sought

necessary permitting approval from government agencies. One such agency is the FAA, which ATXI has been communicating during the route selection and design process. Unfortunately, in this case, the FAA has determined that a portion of the route approved for the Project poses a hazard to a VORTAC facility, and mitigation is not a viable alternative.

Q. What is a VORTAC?

A. A VORTAC is an FAA-regulated facility that serves as a short-range radio navigation system for aircraft. A VOR is a “very high frequency omni directional range” beacon, and TAC stands for TACAN, which is a military tactical air navigation beacon. These beacons are co-located in a facility called a VORTAC facility.

Q. Please explain POWER Engineers' role in the matter.

A. In early 2013, ATXI engaged POWER Engineers to conduct preliminary structure spotting for the routes being considered for the Project, including the Quincy to Meredosia line segment. After preliminary structure spotting, POWER Engineers undertook a review of whether ATXI must submit forms to the FAA related to particular structures. POWER Engineers visited the FAA website and used their “Notice Criteria Tool” (NCT) to input the coordinate, ground elevation and height of every structure. The NCT advises if ATXI must submit FAA Form 7460-1 “Notice of Proposed Construction or Alteration”. After an approved route was selected by the Commission, POWER Engineers submitted a Form 7460-1 for each structure where the NCT had indicated a Form 7460-1 was required. This included the structures that pass by the Quincy VORTAC. Part of POWER Engineers’ role was then to help obtain FAA approval for structure locations to the extent required.

66 **Q. Are there FAA regulations that restrict transmission line structures in proximity to**
67 **a VORTAC facility?**

68 A. Yes. Restrictions for power lines in the vicinity of a VORTAC are described in FAA
69 Order 6820.10, Chapter 4, Subparagraph 17.c.(3)(d). No power line structures are allowed
70 within 1,200 feet of a VORTAC, and height restrictions apply that are a function of the distance
71 from the VORTAC and the power line route orientation relative to the VORTAC.

72 **Q. Why aren't forms submitted to the FAA for approval before the route is approved**
73 **and designed?**

74 A. It is not practical. The FAA process requires that a form be submitted for review of every
75 structure location. Structure location cannot be known until the route has been approved and
76 some amount of line design work has occurred. ATXI proposed two separate routes for the
77 Illinois Rivers Project - a primary and alternate route for the Project, which in total represented
78 more than 800 miles of potential routing. In addition, many parties intervened and proposed
79 additional miles of routing options. The FAA does not have the time or resources to evaluate
80 and approve every potential structure of every potential route for the Project, and it is simply not
81 practical to obtain permits at this phase of the Project.

82 **Q. What is the process for obtaining FAA approval for the location of the transmission**
83 **line structures?**

84 A. The first step is to determine if a structure is in proximity to an airport or air navigation
85 system. This can be determined by using the NCT to input the coordinate, ground elevation and
86 height of every structure. As discussed, if a structure is in proximity to an airport or air
87 navigation facility, the NCT advises that FAA Form 7460-1 "Notice of Proposed Construction or

Alteration” must be submitted. Form 7460-1 is required for each structure in proximity to an airport or air navigation system and must be submitted at least 45 days before construction is to begin. The FAA then evaluates the location and type of structure involved in the construction to determine if there will be any interference with air navigation. The FAA will provide a determination within approximately 45 days of their receipt of Form 7460-1. The determination will be titled either “Determination of No Hazard to Air Navigation” or “Notice of Presumed Hazard.” A “Determination of No Hazard to Air Navigation” constitutes the FAA’s acknowledgement that the proposed construction will not interfere with air navigation.

Q. Did ATXI follow this procedure?

A. Yes. During the final line design of the Quincy to Meredosia segment of the transmission line, ATXI submitted the coordinates of each of the transmission poles on Forms 7460-1 titled “Notice of Proposed Construction or Alteration”, which were submitted to the FAA on November 11, 2013, over a year before the construction was scheduled to begin.

Q. What was the FAA’s initial response?

A. On January 2, 2014, the FAA issued a No Hazard Determination Letter for this portion of the transmission line. Therefore, at that time, ATXI believed the FAA had provided its approval of the Commission-approved route for the Quincy to Meredosia segment.

Q. Was the FAA initial response correct?

A. No. On January 24, 2014, the FAA reversed course and issued a Notice of Presumed Hazard for transmission poles C244 to C259 (see ATXI Ex. 7.1 as representative of one of the Notices from the FAA; a Notice was received for each structure). The Notices found that these

109 transmission poles may have an adverse physical or electromagnetic interference on navigable
110 air space.

111 **Q. What was the basis of the FAA's determination?**

112 A. The FAA found that the location of the transmission line's structures were too close to
113 the VORTAC and that the location and design would cause unacceptable levels of interference
114 with the VORTAC.

115 **Q. What happened as a result of the Notices of Presumed Hazard?**

116 A. The FAA then conducted a more detailed study, which concluded that poles C244
117 through C259, or a total of 16 structures, could not be constructed as located because of the
118 possible interference with VOR signals. As a result of the study, ATXI and the FAA met to
119 discuss possible methods ATXI could employ to mitigate any VORTAC impact.

120 **Q. What mitigation methods did ATXI and the FAA consider to avoid the VORTAC**
121 **impact?**

122 A. ATXI and the FAA discussed several mitigation methods to avoid an impact to the
123 Quincy VORTAC including: (i) dopplerizing the VORTAC site; (ii) rebuilding the VORTAC on
124 a new location; (iii) undergrounding the Transmission Line; (iv) utilizing wood structures in
125 place of steel structures along the approved route.

126 **Q. Were any of these mitigation methods feasible?**

127 A. No. The cost and/or time and approval requirements associated with each of these
128 mitigation methods are considerable, and so none are feasible. The FAA will not approve an
129 overhead transmission line in this area. Dopplerizing the present VORTAC site would require
130 replacing the existing VOR equipment with specialized doppler radar equipment. This process

would take a minimum of four years and resolve the issue with the VOR (VHF omnidirectional range) portion of the VORTAC; however, this alternative may not resolve the issue with the TAC (tactical air navigation) portion and would still require approval from the United States Military. Rebuilding the VORTAC at a new location would take four years just for study, siting and site acquisition, and would cost between \$10 million and \$20 million. This also would require military approval. Using wood structures instead of steel is not viable because the Commission approved route encroaches upon the 1,200 foot exclusion zone set forth in the FAA regulations. Undergrounding is not cost effective as discussed by Mr. Gerhardt. Ultimately, ATXI and the FAA concluded that a different route for the transmission line was the only feasible solution to avoid the VORTAC interference.

Q. How did ATXI select a different route?

A. ATXI witnesses Ms. Emily Hyland and Mr. Kevin Gerhardt will discuss the process ATXI used to select the proposed routes for the Transmission Line. However, one of the key criteria for any route was to avoid any VORTAC interference.

Q. How did ATXI determine that the proposed new routes would avoid any VORTAC interference?

A. POWER Engineers conducted preliminary structure spotting for each proposed new route and developed a concept for each structure that would comply with the height restrictions described in FAA Order 6820.10.

Q. Has the FAA reviewed the new proposed routes?

A. The FAA reviewed the initial version of the Alternate Route shown as Route C on Figure 4 of ATXI Exhibit 5.1 and issued no hazard determination letters for that initial version of the

153 route. Although the FAA has not made formal determinations on the Primary Route or the
154 Alternate Route, given the distance of the Primary Route from the VORTAC facility and the
155 modifications to the Alternate Route moving it further from the VORTAC, as well as the effort
156 given to ensuring compliance with height restrictions of FAA Order 6820.10, ATXI does not
157 believe that either route will violate the FAA's regulations. POWER Engineers will finalize
158 design and have the FAA review the structures for whichever route is selected by the
159 Commission, after that route has been identified.

160 **IV. CONCLUSION**

161 **Q. Based on communications with the FAA, do you believe that a new route is required**
162 **for the 2 1/2 mile segment of the Quincy to Meredosia segment of the Project?**

163 A. Yes. The only way to cost effectively avoid interference with the VORTAC facility on
164 the Quincy to Meredosia segment of the Project is to utilize a different route.

165 **Q. Does this conclude your testimony?**

166 A. Yes. It does.



DAVID WEDELL, P.E.

PROJECT MANAGER

YEARS OF EXPERIENCE

41

EDUCATION

- > B.S., Civil Engineering, Structural Specialty, Southern Illinois University, 1973

AREAS OF EXPERTISE

- > Project management and contract administration
- > Project evaluation and feasibility reports
- > Analysis and design of concrete, wood pole and steel transmission line structures
- > Preparation of structural design computations
- > Evaluation of soil borings and foundation design
- > Hardware assembly selection
- > Route selection
- > Plan and profile
- > Structure staking for field reference
- > Material specifications, bid evaluation and expediting
- > Construction specifications and contract documents
- > Engineering and construction cost estimates
- > Field operations

LICENSING

- > P.E., Civil: Missouri
- > P.E., Civil: Minnesota
- > P.E., Civil: New Mexico
- > P.E., Civil: Wisconsin
- > P.E., Civil: Oklahoma
- > P.E., Civil: Indiana
- > P.E., Civil: Georgia
- > P.E., Civil: Ohio
- > P.E., Civil: South Carolina
- > P.E., Civil: Vermont
- > P.E., Civil: Mississippi
- > P.E., Civil: Illinois
- > P.E., Civil: Connecticut
- > P.E., Civil: Kentucky
- > P.E., Civil: Pennsylvania
- > P.E., Civil: Maryland

EXPERIENCE SUMMARY

Mr. Wedell brings a thorough and impressive background in transmission line projects. As project engineer, he typically is responsible for project management, transmission line engineering and the planning and execution of civil/structural engineering and design activities in support of transmission, substation and distribution projects. As a civil/structural specialist, Mr. Wedell excels in solving difficult structural challenges, including river crossings and unstable soils. His meticulous care and conscientious attention to detail benefits every project that he undertakes.

Ameren, Engineering Services Agreement, Missouri

Project Manager responsible for the management and oversight of transmission line projects under this contract. Supervises several project teams of engineers and designers. Services include project scoping, preliminary engineering, routing studies, final engineering and construction support. Projects have included 138 kV, 161 kV and 345 kV transmission line projects including thermal uprating studies and design, line rerouting design and relay design. POWER has provided design services for numerous substation and transmission line projects since 1999.

Ameren, Illinois Rivers Project Transmission Line Final Design, Illinois

Project Engineer responsible for coordinating multiple design teams for this 350-mile 345 kV transmission line initiative. Responsibilities include assisting Ameren to develop preliminary specifications and Level 1 Schedules, developing an overall plan for final designs, organizing design teams for final design, and serving as overall Design Manager. POWER is providing final design for the Illinois Rivers Project, consisting of 13 segments of 345 kV transmission line totaling more than 350 miles. POWER's services include detailed line design, vendor coordination, associated studies, cost estimating, construction specifications and engineering support during construction. The Illinois Rivers Project is part MISO's portfolio of Multi-Value Projects.

American Electric Power, AEP/STEC 345 kV San Miguel-Lobo Structure Alternatives Evaluation, Texas

Senior Consultant responsible for overall technical review of the study. POWER provided conceptual design services and cost estimating to compare two existing structure families for a 104 mile transmission line which would connect the existing San Miguel Power Plant to the new Lobo Switching Station. Structures considered included double circuit 345 kV tubular steel monopole structures and double circuit 345 kV lattice steel self-supporting towers. The study included development of design criteria for steel pole and lattice tower construction; selection of conductor and shield wire; structure

- > P.E., Civil: Virginia
- > P.E., Civil: Nebraska
- > P.E., Civil: North Dakota

AFFILIATIONS

- > American Society of Civil Engineers

analysis and evaluation; and foundation design.

American Electric Power, Structure Alternatives Evaluation, Texas

Project Manager responsible for managing the project team, budget and schedule. POWER provided conceptual design services and cost estimating to compare three different structure options for a 345 kV line. The study included an analysis of electrical effects such as audible noise, radio and TV interference as well as electric and magnetic field strengths. A complete structural analysis utilizing Power Line Systems software was performed. Foundation designs were developed to go with the typical soil profiles. Minimum right of way widths were developed for each of the structure options and material and labor quotes were solicited from vendors and electrical contractors to add validity to the cost estimates. The conclusions of the study allowed the utility to proceed with the most effective overall solution for the project.

American Transmission Company, Arrowhead to Weston 345 kV Transmission Line, Wisconsin

Project Manager responsible for overall management of all project activities for the design and construction of a major new transmission line constructed by Minnesota Power and Wisconsin Public Service Corp. The project involved design and construction of a new 220-mile-long, 345 kV steel pole transmission line running from southern Minnesota to central Wisconsin. POWER's project scope included field surveys, electrical studies, structure designs, line design, material specifications, construction specifications, right of way acquisition and construction monitoring services. The noteworthy project received achievement awards from the Wisconsin chapter of ASCE and from the Edison Electric Institute.

Kenny Construction Company, 500 kV Trans Allegheny Interstate Line, Multiple States

Transmission Line Project Engineer for design of the TrAIL 500 kV transmission line. Responsible for planning, organizing and executing technical work, including compliance with Pennsylvania, West Virginia, Maryland and Virginia regulations, associated with design of the 500 kV line and 138 kV underbuild. POWER was the design and permitting contractor for this 160-mile line that spans Allegheny Energy's service territory from SW Pennsylvania through West Virginia to northern Virginia. POWER provided environmental resource studies and jurisdictional permitting and licensing services, and detailed transmission line engineering and design, including material specification and establishing new line and structure design criteria.

McPhee Electric, Beseck 345 kV Switching Station, Connecticut

Civil Engineer with responsibility for professional engineer review and certification of the substation foundation designs. POWER provided engineering design and technical support for the Northeast Utilities Beseck Switching Station as the engineering subcontractor to McPhee Electric, the prime contractor for this EPC project. The station is part of a major upgrade expansion to the utility's system. Beseck is a 345 kV, seven breaker

switching station with four 345 kV transmission line connections. The design layout accommodates future expansion/addition of five breakers and associated bus.

Northeast Utilities, Bethel-Norwalk 345 kV Project, Connecticut

Civil Engineer with responsibility for professional engineer review and certification of the transmission line and transition station foundations. The project involved the construction of a 20-mile overhead/underground 345 kV transmission line, a 12-mile overhead/underground 115 kV line, three transition stations and modifications to an existing substation. POWER provided a full range of project implementation services, from preliminary engineering through construction management and inspection. This complex project was completed ahead of schedule. It also featured an incentive program for which POWER received a 100% score.

Peace River Electric Cooperative, Crawley 138 kV Project, Florida

Project Manager with overall responsibility for a multi-faceted system upgrade project. POWER's scope included development of a four-year Construction Work Plan; design of the new 69 kV-24.9 kV Myakka Substation and new 138 kV-24.9 kV Crawley substation; and design of a new five-mile 138 kV transmission line with distribution underbuild. Services included design, survey, geotech, procurement assistance, crossing permits, environmental permitting, full-time construction inspection, and testing and commissioning of the substations. The system upgrade project will provide system reinforcement and back-up capacity to help the cooperative meet growing loads.

Wisconsin Public Service Corporation, Ladysmith Fiber Optic Regeneration Station, Wisconsin

Project Manager responsible for work scope, financial, project assignments and monitoring progress. POWER performed engineering services for construction of a fiber optic regeneration station. The station was needed to amplify communication signal over the OPGW shield wire which runs the entire length of the 220 mile Arrowhead Weston 345 kV line. POWER was also responsible for a transfer switch for a generator plug-in and site work required for station maintenance.

Xcel Energy Services, CapX2020 Fargo-St. Cloud-Monticello 345 kV Transmission Line, Multiple States

Project Engineer responsible for planning, directing and supervising transmission line designs. Specific tasks include preparing geotechnical subcontracts, coordinating with geotechnical subcontractors, preparing cost estimates, assisting in schedule preparation and maintenance, preparing material specifications and construction specifications. The project entails detailed engineering and construction support for 133 miles of new double-circuit-capable 345 kV transmission line, part of the CapX2020 initiative in North Dakota and Minnesota. The project will use steel pole structures on drilled pier foundations and specialty foundations in some areas.

Xcel Energy Services, Lakefield Junction to Fox Lake 161 kV Transmission Line, Minnesota

QA/QC Reviewer for a new 26-mile 161 kV transmission line. The structures are single shaft steel poles on concrete caisson foundations. The conductor is 795 kcmil 26/7 ACSS with one 3/8-inch EHS shield wire. The line extends from Lakefield Junction Substation northeast of the city of Jackson along the I-90 corridor to Fox Lake Substation near the town of Temperance Lake. The line detours from the I-90 corridor around the city of Jackson because of height restrictions at the Jackson airport.

Peabody Energy, Thoroughbred Plant to Paradise (TVA) 500 kV Line, Missouri

Project Engineer for preliminary engineering services for the line connecting the Thoroughbred Energy Center to Paradise substation on the Tennessee Valley Association system. The work consisted of developing conceptual designs for 500kV structures, foundations, and conductor for the line. These designs were then used to develop a preliminary line layout for permitting and discussions with TVA. Preliminary cost estimates were also developed.

Ameren Services Co., Grand Tower-Steelville 138 kV Transmission Line, Missouri

Project Manager for a 14-mile, 138 kV transmission line constructed on wood H-frame structures. Preliminary designs were created to make recommendations to upgrade the line capacity from approximately 190 MVA to 285 MVA. This process required conductor studies, field surveys to verify existing line conditions, evaluations of the existing wood H-Frame structures and multi-span modeling of the transmission systems. Final designs included replacing existing 477 KCM ACSR conductor with 556 KCM ACSS, modifications to existing structures and inserting new structures into the line. Responsible for directing preliminary and final design activities, specifications for material and construction and directing engineering support required during construction.

Ameren Services Co., Pawnee-Taylorville 138 kV Transmission Line, Missouri

Project Manager on an upgrade of an 18-mile, 138 kV transmission line constructed on wood H-frame structures. Preliminary designs were conducted to make recommendations to upgrade the line capacity from approximately 190 MVA to 285 MVA. This required conductor studies, field surveys to verify existing line conditions, evaluations of the existing wood H-Frame structures and multi-span modeling of the transmission systems. Final designs included replacing existing 350 Copper conductor with 556 KCM ACSS, modifications to existing structures and inserting new structures into the line. Responsible for directing preliminary and final designs activities, specifications for material and construction and directing engineering support required during construction.

Lee County Electric Coop., Pine Island-Sanibel 69 kV to 138 kV Rebuild, Florida

Project Manager for the upgrade of an existing 69 kV transmission line to

138 kV. The existing line is 10 miles long and is constructed on wood poles, concrete poles and steel poles. It includes a crossing of the Intercoastal Waterway between Pine Island and Sanibel Island and it must remain energized during construction. The project includes environmental permits, coordination of surveys and geotechnical investigations, tidal surge evaluations, structure designs, transmission line design and construction management.

Plains Electric Generation and Transmission Cooperative, Engineering and Operations Support, New Mexico

Project Manager for all work being performed for this RUS G&T.

- > Deming Substation included designs and construction inspection for installation of a 138 kV/69 kV transformer and circuit switcher and upgrading the 69kV switchyard.
- > Bluewater Substation involved converting an existing 25 kV switchyard from a single bus to a main and transfer bus scheme.
- > Alamogordo Relief Route involved designs to modify two 115 kV transmission lines for a new state highway.
- > Belen – Willard involved replacing a guyed wood pole deadend with a self-supporting tubular steel pole structure.
- > Algodones – San Ysidro involved designs to remove one structure and relocate another that was being threatened by erosion of the Rio Grande River. The two existing structures were replaced with a self-supporting tubular steel pole deadend.
- > Miscellaneous cost estimates involved preparation of detailed cost estimates for 14 capital improvement projects for being considered by Plains planning personnel.
- > Miscellaneous Highway Crossing Permit Applications involved as-built surveys and designs to renew miscellaneous stated highway crossing permits.
- > Miscellaneous Operations Support involves providing miscellaneous support to Plains' operations group on an as-needed basis.

Union Electric Company (UE), Selma-Rivermines-Taum Sauk 138 kV Transmission Line Upgrade, Missouri

Project Manager for the thermal upgrade of 36 miles of 138 kV steel tower double-circuit transmission line. Project involved two lines of 28 and 8 miles leading to UE's Taum-Sauk pumped storage facility. The project included field surveys, field measurements to determine sag-tension characteristics, evaluations of the existing lattice steel towers and multi-span modeling of the transmission systems.

Municipal Electric Authority of Georgia, Bonaire-Butler 230 kV Line Upgrade, Georgia

Project Engineer for the upgrade of this 43.5-mile-long, 230 kV transmission line in central Georgia. The line is constructed on tubular steel H-frame structures. It was modified to improve power flow by upgrading from a maximum operating temperature of 50 degrees C to 100 degrees C. The upgrade required six new concrete pole H-frame structures and modifications to 48 tangent structures. The engineering and construction were completed on time and in budget, eight months after the notice to proceed.

Union Electric Company, Raise Sioux - Mason 345 kV Line for Page Avenue Extension, Missouri

Project Manager to replace several structures of this double-circuit, tubular steel, 345 kV line. The wires needed to be raised about 45 feet to permit construction of a new highway across the Missouri River.

Lee County Electric Cooperative, Transmission Line Projects, Florida

Project Manager for three transmission line improvement projects for LCEC. These projects included:

- > Lehigh South 138 kV Line: A new two-mile line to serve a new 138 kV/24 kV substation through a T-tap into an existing line. The project included 30 spun concrete structures and GOAB switches installed on three concrete poles.
- > GOABs at Aqualinda Junction: A rebuild of a T-tap junction and upgrade of GOAB switches from 138 kV to 161 kV. New 161 kV Turner GOAB switches replaced the existing GOAB Kearney 138 kV "V" switches on spun concrete poles.
- > Juanita Boulevard North Road Extension: Relocated an existing three-way tap to make room for a new intersection created by extending Juanita Boulevard to Tropicana Parkway. New self-supporting steel pole structures on concrete caisson foundations and concrete structures replaced existing single wood pole structures. The GOAB switches were upgraded. This project included construction inspection services.

Union Electric Company, Raise Structure 31 of Sioux - Mason 345 kV Line, Missouri

Project Manager to raise an existing double-circuit, tubular steel, 30-degree angle structure by 27 feet. The change was necessary to allow construction of a new road and levee under the 345 kV line.

Hoosier Energy REC Inc., Reeves Rd 69 kV Line, Indiana

Project Manager for design of a 6.5-mile 69 kV transmission line with 12.5 kV underbuild in Indiana to RUS standards.

Union Electric Company, Mississippi Supply and Sioux - Roxford 138 kV Lines, Missouri and Illinois

Project Manager for the evaluation of 15 lattice steel towers for a 138 kV transmission line that included a 2,500-foot crossing of the Mississippi River with towers more than 177 feet tall. Services included detailed computer analysis of existing towers to determine what changes were necessary to replace existing 7/16" EHS shield wire with 83mm² optic groundwire (OPGW). Because the towers did not have the strength to hold the groundwire, a means was devised to attach an all dielectric, self-supporting (ADSS)-type fiber optic cable to the tower body.

Union Electric Company, Mississippi 3rd Supply 138 kV Lines, Missouri

Project Manager for an evaluation of existing tubular steel pole structures to

determine whether existing shield wire could be replaced with fiber optic ground wire.

Union Electric Company, Cahokia - Central 138 kV Transmission Line, Missouri, Illinois

Project Manager for an evaluation of eight existing lattice steel towers for a 138 kV transmission line that included a 3,000-foot crossing of the Mississippi River with towers more than 250 feet tall. Services included detailed computer analysis of existing towers to determine what changes were necessary to replace existing 7/16" EHS shield wire with 90mm² fiber optic groundwire.

Westinghouse Corporation, Whitewater Cogeneration Facility, Wisconsin

Project Engineer responsible for civil/structural support for design of a five-mile, 138 kV, double-circuit transmission line constructed on tubular steel poles. Services included structure design, foundation design, hardware selection, material specifications and construction specifications.

Hoosier Energy REC Inc., Blue Creek - Big Cedar 69 kV Thermal Uprate, Indiana

Project Manager for an evaluation of the thermal operating limits of a 69 kV transmission line in Indiana. Services included field surveys to evaluate as-built conditions and design recommendations for modifications necessary to upgrade the thermal operating capacity from 50 degrees C to 80 degrees C.

Plains Electric G&T Cooperative, Transmission System Service Life Study, New Mexico

Project Manager responsible for conducting a study of a 1,256-mile transmission system consisting of voltages ranging from 69 kV to 345 kV. Structure types included wood H-frame and tubular steel construction. The study concluded with a recommendation concerning the anticipated useful life of the transmission system components. The report was used to support a change, which was accepted by RUS, in the client's capital depreciation schedule.

Indianapolis Power & Light Company, Petersburg - Breed 345 kV Line, Indiana

Project Manager for inspection and repair of a 345 kV lattice tower transmission line in Indiana. This line consisted of 250 345 kV lattice steel towers installed on concrete caisson (drilled pier) foundations. Many of the towers were experiencing damage due to severe rusting of the stub angles where they emerge from the concrete. Services included field inspection, using ultrasound measuring devices, to determine the amount of parent material remaining, evaluating the capacity of each stub to withstand its original intended design loads, identifying stubs that must be repaired or reinforced, engineering the repair and reinforcing, preparing specifications and construction inspection of the repair.

Union Electric, Relocation of Sioux - Mason Transmission Line for Harrah's Club Harbor Project, Missouri

Project Manager for relocation of several spans of a 345 kV transmission line. Construction was on tubular steel transmission structures. Services included design, material procurement specifications and construction specifications. This work was performed as a rush project and was completed on schedule, eight months after project inception.

Plains Electric Generation & Transmission, Ciniza Tap 115 kV Line, New Mexico

Project Manager for a two-mile, double-circuit, 115 kV transmission line. This project was designed to REA specifications. Services included PI selection, plan and profile surveys, easement descriptions, structure designs, tubular steel pole procurement specifications, structure spotting, foundation designs and preparation of construction specifications.

Southwest Public Service, Urton - Roswell City 115 kV Line, New Mexico

Project Manager for a 115 kV transmission line constructed on tubular steel structures with drilled caisson foundations. Services included structure spotting, structure configuration designs, loading drawings, shop drawing reviews and foundation designs for 75 tubular steel structures.

Indianapolis Power & Light Company, Petersburg - Guion 345 kV Line, Indiana

Project Manager for inspection and repair of a 345 kV lattice tower transmission line in Indiana. This line consisted of 600 345 kV lattice steel towers installed on concrete caisson (drilled pier) foundations. Many of the towers were experiencing damage due to severe rusting of the stub angles where they emerge from the concrete. Services included field inspection, using ultrasound measuring devices, to determine the amount of parent material remaining, evaluating the capacity of each stub to withstand its original intended design loads, identifying stubs that must be repaired or reinforced, engineering the repair and reinforcing, preparing specifications and construction inspection of the repair.

Central Louisiana Electric Company, Toledo Bend - Coushatta 500kV Line and Richard - Webre 500 kV Line, Louisiana

Project Manager for inspection program for 60 miles of 500 kV lattice tower transmission line structures. A total of 309 structures were inspected.

Central Illinois Public Service Company, West Frankfort - Norris City 345 kV Line, Illinois

Project manager in charge of foundation designs for this 345 kV transmission line constructed on "Y" shaped, steel pole structures with drilled caisson foundations. Foundations were designed for 27 structures.

Seminole Electric Cooperative, Hardee Power Station 230 kV Transmission Line, Florida

Senior Structural Engineer responsible for the preparation of foundation designs and steel transmission line structures. This line was 80 miles long. Approximately 10 miles were double-circuit and 70 miles were single-circuit. There were a total of more than 20 structure types used to accommodate a wide range of special applications for this line.

Central Florida Utility, Car Care 69 kV Line, Florida

Civil/structural support for design of a 69 kV transmission line in Florida constructed on pre-stressed concrete poles.

LEMCO Engineers (International), Inc., South Pacific

As President, responsible for business development, planning, management and execution of all engineering assignments and administrative services for international subsidiary. Specific focus was on project development in Thailand, Malaysia and Singapore. Successfully developed work with all three utilities in the Kingdom of Thailand. Managed a staff of 10 to 12 expatriate engineers and coordinated all home office support. Projects included electrical studies, design and construction management for transmission and substation facilities.

Electricity Generating Authority of Thailand, Tha Tako-Nong Chok 500 kV Line, Thailand

Project Manager for a major 500kV transmission line and substation system in Thailand. Services included complete design and construction management for 400 miles of 500 kV steel tower transmission line and a 500/230 kV SF-6 insulated substation. Included complete design, survey, procurement specifications and construction management. Also included is the design of a family of 500 kV lattice steel structures for re-application in a confined urban right of way.

Provincial Electricity Authority Thailand, Transmission System Development Project, Thailand

Project Executive for development of sub-transmission expansion plan for a distribution utility in Thailand. Project included data collection, identification of alternative expansion scenarios, load forecasting, power system analysis and economic evaluation.

Metropolitan Electricity Authority, Value Engineering, Bangkok, Thailand

Project Executive for a value engineering study of transmission, distribution and substation projects for a utility in Thailand. Project included training engineers in the concepts and step-by-step procedures in value engineering, and leading value engineering five-man teams in various project studies.

Metropolitan Electricity Authority of Thailand, System Losses Evaluation, Thailand

Project Executive for a study of the electric power system serving the greater Bangkok metropolitan area to determine the source of unidentified power losses.

Metropolitan Electricity Authority of Thailand, SCADA Study, Thailand

Project Executive for a study to recommend a SCADA system to control the electric power system serving the greater Bangkok metropolitan area.

Metropolitan Electricity Authority of Thailand, Design and Installation of SCADA System, Thailand

Project Executive for the detailed design and procurement of a SCADA system to control the electric power system serving the greater Bangkok metropolitan area. Services included procurement specifications, bid solicitations, bid evaluations and supervision of installation of the SCADA system.

Dayton Power & Light, Greene-Overlook-Webster 138 kV Upgrade, Ohio

Project Manager for a 69 kV to 138 kV transmission system upgrade. Services included design, material procurement, construction and construction management services for this turnkey project involving upgrades to seven substations and five transmission lines.

Madison Gas & Electric Company, Middleton-Timber Lane Tap 69 kV Transmission Line, Wisconsin

Project Manager for the West Middleton-Timber Lane Tap 69 kV Transmission Line project. Services included design, right of way selection and centerline surveys for 1.9 miles of conventional wood pole 69 kV transmission line. Terrain is rural and hilly.

Madison Gas & Electric Company, Sycamore-Sprecher 138 kV Transmission Line, Wisconsin

Project Manager for the Sycamore-Sprecher 138 kV transmission line. Services included design, right of way selection and centerline surveys for five miles of conventional wood pole 138 kV transmission line, initially operated at 69 kV. Terrain is urban.

Madison Gas & Electric Company, Transformer Drawing Review, Wisconsin

Project Manager for a transformer drawing review. Services included reviewing field marked prints for self-protected power transformers to determine as-built condition. Includes transferring as-built drawings into AutoCAD.

Madison Gas & Electric Company, Detailed Evaluation of Operating Limits, Wisconsin

Project Manager for a detailed evaluation of thermal operating limits on 69 kV and 138 kV transmission systems. Services include complete evaluation of the as-built condition of the 69 kV and 138 kV transmission lines including recommendations with regard to remedial action necessary to improve operating limits to higher temperatures.

Madison Gas & Electric Company, CSP Power Transformer Review Project, Wisconsin

Project Manager for CSP Power Transformer Review Project. Services include transformer drawing reviews, loading schematics and wiring diagrams on a CAD system and design for EMS additions.

Central Illinois Public Service, 161 kV Reconductor Project, Illinois

Project Manager for a midwestern investor-owned utility project to upgrade a 161 kV transmission line. Project entailed the upgrade of an existing 161 kV line constructed on lattice steel H-frame structures from a single sub-conductor per phase to a twin bundle configuration per phase. Work included analysis, design and recommendation of construction procedures for modification of existing structures.

Aramco Services Company, Al Hassa Area Power System, Saudi Arabia

Project Manager for a 230/115/34.5 kV transmission and substation system in Saudi Arabia. Project consisted of 30 miles of 115 kV wood pole line; 20 miles of 230 kV steel tower transmission line; design of four new substations and modifications to three existing stations. High atmospheric contamination due to the unique environment required special consideration.

Iowa Public Service Co., Raun - Hoskins 345 kV Line, Iowa, Nebraska

Project Manager for a 345 kV transmission line project. Transmission line included a crossing of the Missouri River and terminated at a 345/161 kV substation. Directed engineering and technical personnel in the engineering design, preparation of construction specifications, bid evaluations and construction management.

Aramco Services Co., Khurais Area 115 kV Transmission System, Saudi Arabia

Project Manager for a 40-mile, 115 kV transmission line with one 300 MVA 230/115 kV substation and three 115 kV line termination stations in Saudi Arabia. Supervised engineering and technical staff engaged in structural design, line design, material specifications and bid evaluations. Special considerations included high atmospheric contamination, due to the desert/coastal environment of Saudi Arabia.

United Arab Emirates, 33 kV Transmission Line, Oman

Project Manager for a 33 kV line in Oman responsible for field route selection, line and foundation design for an eight mile double-circuit, steel tower transmission line.

Alaska Power Authority, Cordova Power Supply Study, Alaska

Project Engineer responsible for conducting studies to determine technical and economic feasibility of various alternatives and presented final recommendations. Methodology included conceptual designs for determining voltage, conductor selection, geotechnical evaluations, structure and foundation design and establishing anticipated wind and ice loadings in an area subject to extreme icing conditions.

Western Area Power Administration, Civil Design Manual, Colorado

Project Engineer for development of a civil design manual prepared for a Western power group. Manual included standards and guidelines for civil and structural design of transmission and substation facilities.

Iowa Public Service Co., Raun - Hinton 345 kV Line, Iowa

Design Engineer for a 345 kV transmission line project. Responsible of evaluating soil borings and preparing foundations for tubular steel pole structures. Participated in preparation of structure designs, conductor and shield wire tension calculations, plan and profile drawings and material specifications for the temporary wood pole H-frame section of the line.

Iowa Public Service Company, Platte River Crossing, Nebraska, Iowa

Responsible for design of a 345 kV river crossing structure at the Platte River in Nebraska. The crossing span was approximately 2,000 feet and structures were lattice steel towers up to 175 feet tall. Services included computations and drawing preparation for structure and foundation designs, conductor and shield wire tension calculations and origination of material specifications. Responsible for directing and monitoring the work of drafting personnel assigned to the project.

Owensboro Municipal Utilities, Ohio River Crossing, Kentucky, Indiana

Responsible for design of two double-circuit 138 kV crossings of the Ohio River near Owensboro, Kentucky. The crossing span was approximately 2,500 feet and structures were lattice steel towers up to 475 feet tall. Services included conductor and shield wire tension calculations, structure spotting, lattice steel tower designs, foundation design, preparation of material specifications and shop drawing reviews. Responsible for directing and monitoring the work of drafting personnel assigned to the project.
